

*Amendment*

The Examiner is respectfully requested to amend the above-identified application as follows:

IN THE SPECIFICATION:

Please substitute the following paragraph for the paragraph starting at page 1, line 16 and ending at line 18. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a1 --In this scheme, information (pitch mark) about the position of each pitch must be recorded concurrently with the storage of speech waveform data.--

Please substitute the following paragraph for the paragraph starting at page 2, line 10 and ending at line 12. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a2 --first calculation means for calculating the distance between first two pitch marks of a voiced portion of speech data to be processed;--

Please substitute the following paragraph for the paragraph starting at page 2, line 13 and ending at line 15. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a3 --second calculation means for calculating the difference between adjacent inter-pitch-mark distances; and--

Please substitute the following paragraph for the paragraph starting at page 3, line 7 and ending at line 10. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a4 --subtraction means for subtracting the maximum value  $d_{max}$  or the minimum value  $d_{min}$  from the length  $d$  on the basis of the comparison results obtained by the first and second comparison means; and--

Please substitute the following paragraph for the paragraph starting at page 3, line 22 and ending at line 25. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a5 --storage means for storing a file for, managing the distance between first two pitch marks of a voiced portion of speech data to be processed and the difference between adjacent inter-pitch-mark distances;--

Please substitute the following paragraph for the paragraph starting at page 4, line 4 and ending at line 8. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a6 --calculation means for calculating the next pitch mark position from a pitch mark position calculated immediately before the calculation, the pitch mark distance to an adjacent pitch mark, and the distance and difference loaded by the first and second loading means.--

Please substitute the following paragraph for the paragraph starting at page 4, line 15 and ending at line 17. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a7 -- a first calculation step of calculating the distance between first two pitch marks of a voiced portion of speech data to be processed;--

Please substitute the following paragraph for the paragraph starting at page 4, line 18 and ending at line 20. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a8 -- a second calculation step of calculating the difference between adjacent inter-pitch-mark distances; and--

Please substitute the following paragraph for the paragraph starting at page 4, line 21 and ending at line 23. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a9 -- a management step of storing the calculation results obtained in the first and second calculation steps in a file and managing the results.--

Please substitute the following paragraph for the paragraph starting at page 5, line 4 and ending at line 8. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a10 -- a first comparison step of, when the length of speech data to be processed is represented by  $d$ , and the maximum value  $d_{max}$  and a minimum value  $d_{min}$  are defined for a predetermined word length, comparing the length  $d$  with the maximum value  $d_{max}$ ;--

Please substitute the following paragraph for the paragraph starting at page 5, line 9 and ending at line 11. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a11 -- a second comparison step of comparing the length  $d$  with the minimum value  $d_{min}$  on the basis of the comparison result obtained in the first comparing step;--

Please substitute the following paragraph for the paragraph starting at page 5, line 12 and ending at line 15. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a12 -- a subtraction step of subtracting the maximum value  $d_{max}$  or the minimum value  $d_{min}$  from the length  $d$  on the basis of the comparison results obtained in the first and second comparison steps; and--

Please substitute the following paragraph for the paragraph starting at page 5, line 16 and ending at line 20. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a13 -- a management step of storing the difference obtained in the subtraction step or the length d in the file and managing the difference or the length on the basis of the comparison results obtained in the first and second comparison steps.--

Please substitute the following paragraph for the paragraph starting at page 6, line 1 and ending at line 4. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a14 -- a storage step of storing a file for managing the distance between the first two pitch marks of a voiced portion of speech data to be processed and the difference between adjacent inter-pitch-mark distances;--

Please substitute the following paragraph for the paragraph starting at page 6, line 5 and ending at line 6. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a15 -- a first loading step of loading the distance between the first two pitch marks of the voiced portion;--

Please substitute the following paragraph for the paragraph starting at page 6, line 7 and ending at line 8. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a16 -- a second loading step of loading the difference between the adjacent inter-pitch-mark distances; and--

Please substitute the following paragraph for the paragraph starting at page 6, line 9 and ending at line 13. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a17 -- a calculation step of calculating a next pitch mark position from a pitch mark position calculated immediately before the calculation, a pitch mark distance to an adjacent pitch mark, and the distance and difference loaded in the first and second loading steps.--

Please substitute the following paragraph for the paragraph starting at page 6, line 21 and ending at line 23. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a18 --a program code for the first calculation step of calculating the distance between the first two pitch marks of a voiced portion of speech data to be processed;--

Please substitute the following paragraph for the paragraph starting at page 6, line 24 and ending at line 26. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a19 --a program code for the second calculation step of calculating the difference between adjacent inter-pitch-mark distances; and--

Please substitute the following paragraph for the paragraph starting at page 7, line 11 and ending at line 15. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a20 --a program code for the first comparison step of, when the length of speech data to be processed is represented by d, and the maximum value dmax and a minimum value dmin are defined for a predetermined word length, comparing the length d with the maximum value dmax;--

Please substitute the following paragraph for the paragraph starting at page 7, line 20 and ending at line 23. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a21 --a program code for the subtraction step of subtracting the maximum value dmax or the minimum value dmin from the length d on the basis of the comparison results obtained in the first and second comparison steps; and--

Please substitute the following paragraph for the paragraph starting at page 8, line 10 and ending at line 14. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a22 --a program code for the storage step of storing a file for managing the distance between the first two pitch marks of a voiced portion of speech data to be processed and the difference between adjacent inter-pitch-mark distances;--

Please substitute the following paragraph for the paragraph starting at page 9, line 11 and ending at line 13. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a23 --Fig. 2 is a flow chart showing pitch-mark-data, file-generation processing executed in the first embodiment of the present invention;--

Please substitute the following paragraph for the paragraph starting at page 9, line 23 and ending at line 25. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a24 --Fig. 6 is a flow chart showing pitch-mark-data, file-loading processing executed in the second embodiment of the present invention; and--



Please substitute the following paragraph for the paragraph starting at page 10, line 10 and ending at line 24. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a25  
--Reference numeral 103 denotes a CPU for performing numerical operation/control, control on the respective components of the apparatus, and the like, which are executed in the present invention; 102 denotes a RAM serving as a work area for processing executed in the present invention, a temporary saving area for various data and having an area for storing a pitch-mark-data file 101a; 101 denotes a ROM storing various control programs such as programs executed in the present invention, for managing pitch-mark data used for speech synthesis; 109 denotes an external storage unit serving as an area for storing processed data; and 105 denotes a D/A converter for converting the digital speech data synthesized by the speech synthesis apparatus into analog speech data and outputting it from a loudspeaker 110.--

Please substitute the following paragraph for the paragraph starting at page 10, line 25 and ending at page 11, line 9. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a26  
--Reference numeral 106 denotes a display control unit for controlling a display 111 when the processing state and processing results of the speech synthesis apparatus, and a user interface are to be displayed; 107 denotes an input control unit for recognizing key information input from a keyboard 112 and executing the designated processing; 108 denotes a communication control unit for controlling transmission/reception of data through a communication network 113; and 104 denotes a bus for connecting the respective components of the speech synthesis apparatus to each other.--

Please substitute the following paragraph for the paragraph starting at page 11, line 10 and ending at line 12. A marked-up copy of this paragraph, showing the changes made thereto is attached.

A27 -- Pitch-mark-data, file-generation processing executed in the first embodiment will be described next with reference to Fig. 2.--

Please substitute the following paragraph for the paragraph starting at page 11, line 13 and ending at line 15. A marked-up copy of this paragraph, showing the changes made thereto is attached.

A28 --Fig. 2 is a flow chart showing pitch-mark-data, file generation processing executed in the first embodiment of the present invention.--

Please substitute the following paragraph for the paragraph starting at page 12, line 18 and ending at page 13, line 3. A marked-up copy of this paragraph, showing the changes made thereto is attached.

A29 --If it is determined that the voiced portion ends (YES in step S6), the flow advances to step S10 to record a voiced portion end signal indicating the end of the voiced portion in the pitch-mark-data file 101a. Note that any signal can be used as the voiced portion end signal as long as it can be discriminated from an inter-pitch-mark distance. In step S11, it is checked whether the speech data has ended. If it is determined that the speech data has not ended (NO in step S11), the flow advances to step S12. If it is determined that the speech data has ended (YES in step S11), the processing is terminated.--

Please substitute the following paragraph for the paragraph starting at page 13, line 4 and ending at line 16. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a30 --It is determined in step S1 that the first segment of the speech data is an unvoiced portion (NO in step S1), the flow advances to step S3 to record unvoiced portion start information indicating that "the first segment is an unvoiced portion" in the pitch mark data file 101a. In step S12, the distance  $d_s$  between the voiced portion and the next voiced portion (i.e., the length of the unvoiced portion) is recorded in the pitch mark data file 101a. In step S13, it is checked whether the speech data has ended. If it is determined that the speech data has not ended (NO in step S13), the flow advances to step S4. If it is determined that the speech data has ended (YES in step S13), the processing is terminated.--

Please substitute the following paragraph for the paragraph starting at page 13, line 17 and ending at line 22. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a31 --As described above, according to the first embodiment, since the respective pitch marks in each voiced portion are managed by using the distances between the adjacent pitch marks, all the pitch marks in each voiced portion need not be managed. This can reduce the size of the pitch-mark-data file 101a.--

Please substitute the following paragraph for the paragraph starting at page ~~13~~, line ~~23~~ and ending at page 14, line 4. A marked-up copy of this paragraph, showing the changes made thereto is attached.

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a33 --In the first embodiment, step S10 may be replaced with step S14 of counting the number (n) of pitch marks in each voiced portion and step S15 of recording the counted number n of pitch marks in the pitch-mark-data file 101a, as shown in Fig. 4. In this case, the processing in step S6 amounts to checking whether the value of the loop counter i is equal to the number n of pitch marks.--

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Please substitute the following paragraph for the paragraph starting at page ~~14~~, line ~~15~~ and ending at line 21. A marked-up copy of this paragraph, showing the changes made thereto is attached.

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a33 --First of all, in step S16, d is compared with dmax. If d is equal to or larger than dmax (YES in step S16), the flow advances to step S17 to record the maximum value dmax in the pitch-mark-data file 101a. In step S18, dmax is subtracted from d, and the flow returns to step S16. If it is determined that d is smaller than dmax (NO in step S16), the flow advances to step S19.--

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Please substitute the following paragraph for the paragraph starting at page 15, line 8 and ending at line 11. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a34 --In the second embodiment, pitch-mark-data-file loading processing of loading data from the pitch-mark-data file 101a recorded in the first embodiment will be described with reference to Fig. 6.--

Please substitute the following paragraph for the paragraph starting at page 15, line 12 and ending at line 14. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a35 --Fig. 6 is a flow chart showing pitch-mark-data-file loading processing executed in the second embodiment of the present invention.--

Please substitute the following paragraph for the paragraph starting at page 15, line 15 and ending at line 26. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a36 --First of all, in step S23, start information indicating whether the start of speech data to be processed is a voice or unvoiced portion, is loaded from a pitch-mark-data file 101a. It is then checked in step S24 whether the loaded start information is voiced portion start information. If voiced portion start information is determined (YES in step S24), the flow advances to step S25 to load a first inter-pitch-mark distance (distance between a first pitch mark  $p_1$  and a second pitch mark  $p_2$  of the voiced portion)  $d_1$  from the pitch mark data file 101a. Note that the second pitch mark  $p_2$  is located at  $p_1+d_1$ .--

Please substitute the following paragraph for the paragraph starting at page 16, line 1 and ending at line 11. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a31  
--In step S26, the value of a loop counter  $i$  is initialized to 2. In step S27, a difference  $d_r$  (data corresponding the length of one word) from the pitch-mark-data file 101a. In step S28, it is checked whether the loaded difference  $d_r$  is a voiced portion end signal. If it is determined that the difference is not a voiced portion end signal (NO in step S28), the flow advances to step S29 to calculate the next inter-pitch-mark distance  $d_i$  and the pitch mark position  $p_{i+1}$  from a pitch mark position  $p_i$ , the inter-pitch-mark distance  $d_{i-1}$ , and  $d_r$  obtained in the past.--

Please substitute the following paragraph for the paragraph starting at page 16, line 11 and ending at line 17. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a38  
--The following equations can be formulated from  $p_i$ ,  $d_{i-1}$ ,  $d_r$ ,  $d_i$ , and  $p_{i+1}$ . The next inter-pitch-mark distance  $d_i$  and the pitch mark position  $p_{i+1}$ , can be calculated by using these equations.

$$d_i = d_{i-1} + d_r \quad \dots (1)$$

$$p_{i+1} = p_i + d_i \quad \dots (2) \text{--}$$

Please substitute the following paragraph for the paragraph starting at page 17, line 11 and ending at line 16. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a39 --As described above, according to the second embodiment, since pitch marks can be loaded by using the pitch-mark-data file 101a managed by the processing described in the first embodiment, the size of data to be processed decreases to improve processing efficiency.--

Please substitute the following paragraph for the paragraph starting at page 17, line 24 and ending at page 18, line 2. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a40 --Assume that the data-length information of loaded speech data is stored in a register d, and a maximum value dmax (e.g., 127), a minimum value dmin (e.g., -127), and a voiced portion end signal are defined for a given word length (e.g., 8. bits) in Fig. 5.--

Please substitute the following paragraph for the paragraph starting at page 18, line 3 and ending at line 12. A marked-up copy of this paragraph, showing the changes made thereto is attached.

a41 --First of all, in step S34, the register d is initialized to 0. In step S35, the data  $d_r$  corresponding to the length of one word is loaded from the pitch-mark-data file 101a. It is then checked in step S36 whether  $d_r$  is a voiced portion end signal. If it is determined that the  $d_r$  is a voiced portion end signal (YES in step S36), the processing is terminated. If it is determined that  $d_r$  is not a voiced portion end signal (NO in step S36), the flow advances to step S37 to add  $d_r$  to the contents of the register d.--